

Experiment: Balloon Thrust Procedure Card

After introducing the Scientific Method, the teacher can walk the students through this simple experiment to help them become accustomed to using the Method.

Lead the students through a discussion of everyday things they have observed and then wondered why they happened. Use the template on the following pages as a guide.

1. For example a question might be:

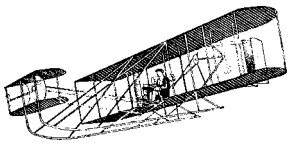
"How is it that an airplane can move forward?"

2. Next, field predictions from the students of what the answer might be:

"Air coming out the back end pushes it forward."

"The engines make it go."

3. Ask students to propose steps for an experiment to prove or disprove their hypothesis. Lead them towards the Balloon Thrust Experiment. Explain to the students what steps you will perform and then have them assist you in creating the procedure and the materials list.
4. Follow the procedure and ask students to observe carefully with all of their senses.
5. Get ideas from the students on how to organize the data: graph, chart, drawing, etc.
6. Ask each student to write their own conclusion.
7. Share and discuss their conclusions.
8. Distribute the Student Reading: Newton's Third Law and read it to them, discussing it as you go.
9. Ask them to rewrite their conclusion based upon this new information.
10. Show them the conclusion given in the Experiment Log Key and ask the students to carefully compare what they wrote to what is given in the Key. Ask them to identify ideas that are missing in their conclusions. Save this work for future comparison.

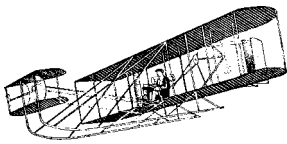


Experiment Log – Key

Page 1

Experiment: Balloon Thrust

Steps	Data
<p>1. <u>State the problem.</u></p> <p>QUESTION</p> <p><i>(What do I want to know?)</i></p>	<p><i>How is it that an airplane can move forward?</i></p>
<p>2. <u>Form a hypothesis.</u></p> <p>PREDICTION</p> <p><i>(What do I think is going to happen?)</i></p>	<p><i>Examples:</i></p> <ul style="list-style-type: none">- Air comes out the back end and pushes it forward.- Air blows out one way and the aircraft moves the opposite way.
<p>3. <u>Design an experiment.</u></p> <p>MATERIALS & PROCEDURES</p> <p><i>(What steps will I take to do this experiment? What things will I need?)</i></p>	<p><i>Materials: Balloon</i></p> <p><i>Procedure</i></p> <ol style="list-style-type: none">1. Gather materials.2. Blow up balloon and hold tightly (do not tie a knot).3. Hold in midair with the mouth of the balloon facing left, so it's parallel with the ground.4. Let go of balloon and observe.5. Repeat steps 2-4, but have mouth of balloon facing to the right.6. Repeat steps 2-4, but have mouth of balloon facing up.7. Repeat steps 2-4, but have mouth of balloon on the ground.



Experiment Log – Key

Page 2

Experiment: Balloon Thrust

Steps

4. Perform the experiment.

OBSERVE and RECORD DATA

(What information did I gather during this experiment?)

5. Organize and analyze data.

(Make a graph, chart, picture or diagram.)

6. Draw conclusions.

(What do my results mean? Was my hypothesis right or wrong? Can I explain why?)

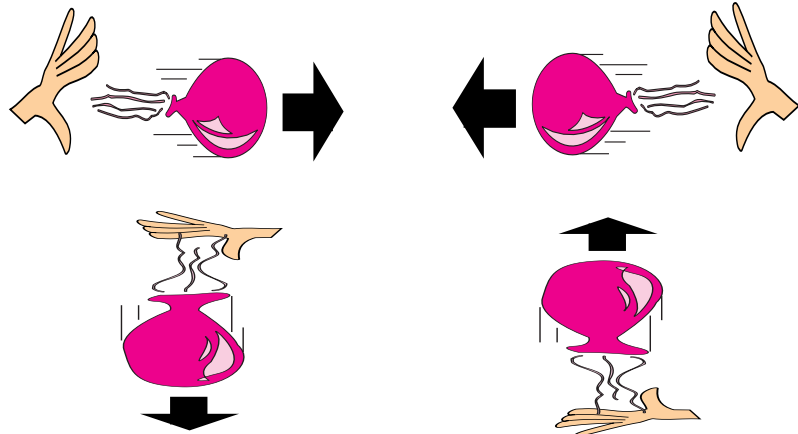
Data

The first time the balloon traveled quickly to the right and then it went up and did some loops before it ran out of air.

The second time the balloon traveled quickly left for a bit before shooting downward in a loop and hitting the ground.

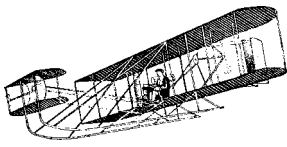
The third time the balloon went nearly straight down quickly into the ground where it ran out of air.

The fourth time the balloon shot up nearly straight up into the air and did some loops before it ran out of air and fell to the ground.



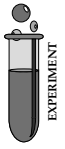
Each time the balloon was released, it immediately traveled in the direction opposite the way the mouth was pointed. For example, when the mouth was pointing to the left, the balloon went to the right. After that, the balloon kind of traveled in the direction opposite where the mouth of the balloon was pointing.

The air rushing quickly out of the mouth of the balloon must push the balloon forward. That means the air rushing out is the thrust that gives the balloon its forward motion. Newton's Third Law says that for every action there is an equal and opposite reaction. The action is the air coming out of the mouth of the balloon. The reaction is when the balloon travels in the direction opposite to where the mouth is pointing. The second hypothesis is correct. An airplane works like a balloon. When the engines blow the air out one way, the airplane goes the opposite way.



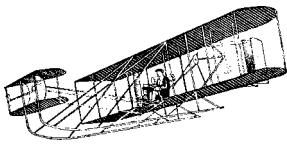
Experiment Log

Page 1



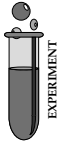
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<p>1. <u>State the problem.</u></p> <p>QUESTION</p> <p><i>(What do I want to know?)</i></p>	
<p>2. <u>Form a hypothesis.</u></p> <p>PREDICTION</p> <p><i>(What do I think is going to happen?)</i></p>	
<p>3. <u>Design an experiment.</u></p> <p>MATERIALS & PROCEDURES</p> <p><i>(What steps will I take to do this experiment? What things will I need?)</i></p>	



Experiment Log

Page 2



Experiment:

Steps	Data
<p>4. <u>Perform the experiment.</u></p> <p>OBSERVE and RECORD DATA</p> <p><i>(What information did I gather during this experiment?)</i></p>	
<p>5. <u>Organize and analyze data.</u></p> <p><i>(Make a graph, chart, picture or diagram.)</i></p>	
<p>6. <u>Draw conclusions.</u></p> <p><i>(What do my results mean? Was my hypothesis right or wrong? Can I explain why?)</i></p>	